

REMARKS

In the Official Action the Examiner rejected Claims 1, 4, 5, 8, and 9-11 under 35 U.S.C. § 103 as being unpatentable over the Kolb et al reference, U.S. Patent No. 5,613,509, in view of the Bach reference, U.S. Patent No. 5,894,130. Applicant has amended independent Claims 1, 5, and 9 to more clearly distinguish Applicant's invention from the references cited. Claim 3 has been amended to correct the typographic error in dependency.

With reference to the application drawings, Applicant's invention as defined in apparatus Claims 1 and 5 is directed to an irradiation apparatus 10 particularly suitable for irradiating packaging materials to neutralize harmful bacteria. The apparatus 10 is comprised of a NEMA 4 water-tight housing 12 that forms an enclosure which a floor 22 in which an irradiation window opening 32 is defined. A quartz window 40 is disposed across the window opening 32 in water-tight sealed engagement therewith. A microwave excited radiation generator 26 is positioned within the water-tight housing 12 proximate the window opening 32 to emit ultraviolet radiation through the quartz window 40 to an area at the exterior of the housing beneath the quartz window 40. A reflector 30 is positioned within the enclosure relative to the microwave excited ultraviolet radiation generator 26 to focus ultraviolet radiation therefrom on the quartz window 40 (page 8, lines 10-12).

An air inlet duct 46 to the housing 12 directs cooling air toward the electrodeless lamp 28. The electrodeless lamp 28 produces ultraviolet radiation. An air outlet duct 48

from the housing withdraws air that has passed the electrodeless lamp 28.

The Examiner relied upon combination of references in rejecting the broadest claims of Applicant's invention. Specifically, the Examiner took the position that the Kolb et al reference disclosed all of the claim elements of the apparatus claims with the exception of a microwave excited ultraviolet radiation generator that includes an electrodeless lamp and a cooling air inlet and outlet. The Examiner stated that the Bach reference discloses such a microwave excited ultraviolet radiation generator and was cooled by directing cooling air toward the electrodeless lamp 26 and withdrawing from the housing air that has passed the electrode lamp. The Examiner stated that it would have been obvious to one of ordinary skill in the art at the time the invention was made to replace the energy generator cooled by water, disclosed in the Kolb et al reference, with the microwave excited ultraviolet radiation generator cooled by air disclosed by Bach. The Examiner referred to the Bach reference passage at col. 1, lines 23-24 in this regard.

Applicant respectfully disagrees that it would be obvious to either substitute the ultraviolet radiation generating lamp 26 of Bach in the enclosure of Kolb et al or to house the ultraviolet lamps 26 of Bach with a surrounding water-tight enclosure.

The Kolb et al reference is directed to a system for removing coatings and contaminants from a substrate (Kolb, col. 6, lines 2-3). More specifically, the Kolb et al system is designed to remove paint from the surfaces of frangible substrates, such as plastic, aluminum, and carbon epoxy (Kolb, col. 6, lines 11-13). To do this Kolb et al

employs a photoflash system utilizing a broadband xenon flash lamp 14 mounted in the housing 12. The flash lamp 14 is positioned within a fused quartz water jacket 61. As stated by Kolb, the light intensity of light energy 18 is in the range of 18-25 joules per square centimeter (Kolb, col. 8, lines 21-25).

Pulses energy of this intensity can be achieved with a pulsed energy xenon flash lamp radiation source of the type utilized in Kolb et al (col. 10, lines 18-35). Pulsed light of this energy is sufficiently great to initiate the ablation/pyrolysis of the layers 24 and 26 of the target area in Kolb et al (col. 8, lines 19-22). However, such a high energy source necessarily requires considerable cooling. The Kolb et al flash lamp 14 and reflector 16 are cooled with deionized water having a temperature of about 50°F supplied at a rate of about two gallons per minute from a water supply to housing 12 through inlet tube 58 and returned through outlet tube 59 (col. 9, lines 52-67).

It should be noted that the housing 12 itself is not watertight and does not lend itself to air cooling. Only the lower housing 52 forms a watertight structure. A gasket 56 is interposed between the upper and lower housings 50 and 52 to keep moist air from penetrating chamber 51 in the upper housing 50. Consequently, the only circulation of coolant available to the optical energy source 14 in Kolb et al is through the inlet tube 58 and out of the outlet tube 59 (col. 1, lines 45-55).

The Bach reference discloses use of an ultraviolet sterilization unit 10 for killing bacteria in the air in a forced heating and cooling system. The ultraviolet sterilization unit

10 is inserted into the cold air return 12 of the air heating and cooling system A. It is also contemplated that the ultraviolet sterilization unit 10 may be placed in other locations within system A and putting the connection 14 between the cool air return 12 and the heating/cooling unit 16 (Bach, col. 4, lines 53-61). The Bach system does not employ any type of reflector.

The Bach system goes to considerable length to ensure that ultraviolet light radiation is not visible externally of the cold air return 12 in which the lamp cartridges 22 and 24 are installed. Bach specifically states "when the lamp cartridges 22(24) are removed, the ultraviolet lamps 26(28) are de-energized." This to prevent ultraviolet rays from being radiated to a user viewing the ultraviolet lamps 26 and 28 (col. 6, lines 29-39). Also, the Bach system not only fails to provide a reflector for focusing ultraviolet light, but to the contrary specifically avoid focusing and attempts to provide a broad coverage of sterilization within the air ducts (col. 6, lines 8-15).

To assemble the structural components of independent apparatus Claims 1 and 5 utilizing the various elements disclosed in the Kolb et al and Bach system one would either have to take certain elements from the Bach system and employ them in the housing structure of the Kolb et al, or utilize the reflector, quartz window, and watertight lower housing 52 disclosed in Kolb et al to surround the microwave excited ultraviolet radiation lamps 26 and 28 in the Bach reference. However, there is no suggestion in either reference to make substitutions and reconstructions of the devices shown in Kolb et al and Bach.

Moreover, even if one were to make these substitutions, the resultant systems would be inoperable for their intended purposes taught in the references.

More specifically, if one were to substitute one of the ultraviolet 26 or 28 disclosed in Bach for the flash lamp 14 in the system of Kolb et al and to substitute a flow of air past the substituted ultraviolet lamp 26 for the flow of distilled water through the inlet and outlet tubes 58 and 59 in Kolb et al, the resultant system would not only fail to operate for the purpose for which the Kolb et al system is designed, but would immediately self-destruct.

More specifically, the entire purpose of the Kolb et al system is to provide enough energy to initiate the ablation/pyrolysis of substantial amounts of layers 24 and 26, such as paint, from a frangible substructure 28, such as plastic, aluminum, and carbon epoxy (col. 6, lines 12-13 and 24-30, and col. 8, lines 19-21). As stated in Kolb et al, the light energy 18 should generally be in the range of 18 to 25 joules per square centimeter at a full width, half maximum (FWHM) pulse, between 1,000 - 2,000 microseconds and time to peak of about one millisecond (col. 8, lines 21-27). However, the Westinghouse Corporation SlimLine STERILAMP suggested in Bach (col. 5, lines 13-25), or any other microwave excited ultraviolet radiation generator could not produce the requisite energy required by Kolb et al (col. 8, lines 23-25) to burn or ablate a substance such as paint from a substrate, which is the whole purpose of the Kolb et al system. The STERILAMP is a low power UV system and would supply only about 150 millijoules of energy per square centimeters.

As held by the Court of Appeals for the Federal Circuit in In Gillette Co. v. S.C.

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Johnson & Son Inc., 16 USPQ 2d 1923 (CAFC 1990):

"Determination of obviousness under 35 USC 103 requires analysis of claimed invention as whole, and focusing on obviousness of substitutions and differences, instead of on invention as whole, is legally improper way to simplify that determination, nor should "obvious to try" be equated with obviousness."

In the case of W. L. Gore and Associates, Inc. v. Garlock, Inc., 220 USPQ 303 (CAFC 1983). The Court of Appeals for the Federal Circuit held:

"There must have been something present in teachings in references to suggest to one skilled in art that claimed invention before court would have been obvious."

In Ex Parte Garrett, 132 USPQ 514 (BPA&I 1962) the Board held:

"It is improper to rebuild reference, in light of applicant's disclosure, in order for it to operate in a manner never intended or contemplated by reference."

One of ordinary skill in the field of material removal by pyrolyzation or ablation (Kolb, col. 1, lines 12-21) would not be motivated to substitute the Bach ultraviolet lamps 26 and 28 for the much higher energy pulsed flash lamp 14 employed in Kolb et al., since to do so would make the system unsatisfactory for its intended purpose.

Furthermore, the STERILAMP is a very low power output UV bulb. If one were to substitute the STERILAMP ultraviolet lamp 26 of Bach for the flash lamp 14 in the Kolb et

al system, and then substitute air for water as a cooling fluid through the inlet and outlet ducts 58 and 59 to the lower housing 52, the result would be a system not only unsuitable for removing paint, but also unsuitable or impractical for the germicidal process of disinfecting food packaging on the other side of the quartz window with the STERILAMP in the position indicated at 14 in the Kolb et al reference. A totally insufficient amount of UV radiation would travel the distance indicated and pass through the quartz window to disinfect food packaging. The cooling system of Kolb et al that employs inlet tube 58 and outlet tube 59 is designed to supply cooling water of about two gallons per minute (col. 9, lines 52-55). If one were to instead circulate air through the lower housing 52 through the inlet tube 58 and outlet tube 59 a comparable volume, about two gallons per minute, would be impractical because the STERILAMP would not supply the necessary power. Moreover, the volume of air circulated through the lower housing 52 cannot be increased enough to provide adequate cooling due to the constrictive effect of the quick disconnect fittings and the small volume of the lower housing taught by Kolb et al (col. 8, lines 57-64; col. 9, lines 28-30).

As held in Ex Parte Rosenfeld, 130 USPQ 113 (1961):

"References are improperly combined inasmuch as examiner's proposed modification of one reference is directly contrary to specific limitation in reference and would render device of reference unsatisfactory for its intended purpose; one skilled in art would not modify such device to make it unsuitable

for its intended purpose".

Also, as held in In Re Rothermel & Waddell, 125 USPQ 329 (CCPA 1960):

"Claims were rejected by what appears to be a piecemeal reconstruction of prior art patents in light of applicants' disclosure; it is easy to attribute to prior art the knowledge which was first made available by applicants and then to assume that it would have been obvious to one having ordinary skill in the art to make these suggested reconstructions, but this is not the type of rejection which statute authorizes."

A comparable inoperable system would result if one were to encase the ultraviolet lamps 26 and 28 in the system of Bach in the waterproof lower housing 52 of the Kolb et al reference with its quartz window 20. Such an arrangement would fail to perform the function of Bach which is the destruction of bacteria and other microorganisms in the air (Bach, col. 1, lines 22-23). As stated by Bach, in order for ultraviolet rays to kill bacteria, etc., the rays must directly strike the microorganisms (col. 1, lines 38-39). The system of Bach is designed for use in air heating and cooling systems to make the air passing through system ducts free from bacteria (col. 1, lines 47-52). Bach specifically provides that ultraviolet lamps 26 and 28 are in an offset relationship from each other, i.e., they are not in the same plane. This is done so as to provide a broader coverage of sterilization within the air ducts (col. 6, lines 8-15).



If one were to encase the ultraviolet lamps 26 and 28 within the watertight lower housing 52 of Kolb et al, only the air flowing past the quartz window 20 would be irradiated. The reflector 16 of Kolb et al would prevent radiation from reaching any portion of the flowing air except that portion of the air flowing past the quartz window 20. As a consequence, the system would then fail to perform its intended purpose of exposing the maximum amount of air possible in the air heating and cooling systems to ultraviolet radiation (Bach, col. 1, lines 47-60).

As held by the Court of Appeals for the Federal Circuit in In re Lee, 61 USPQ2d 1430, at pp. 1432 - 1433:

"The essential factual evidence on the issue of obviousness is set forth in Graham v. John Deere Co, 383 U.S. 1, 17-18, 148 USPQ 459, 467 (1966) and extensive ensuing precedent... When patentability turns on the question of obviousness, the search for an analysis of the prior art includes evidence relevant to the finding of whether there is a teaching, motivation, or suggestion to select and combine the references relied on as evidence of obviousness. See. e.g., McGinley v. Franklin Sports, Inc., 262 F.3d 1339 1351-5, 60 USPQ2d 1001. 1008 (Fed. Cir. 2001) ("the central question is whether there is reason to combine [the] references." a question of fact drawing on the Graham factors).

"The factual inquiry whether to combine references must be thorough and searching." *Id.* It must be based on objective evidence of record. This

precedent has been reinforced in myriad decisions, and cannot be dispensed with. See, e.g., *Brown & Williamson Tobacco Corp. v. Philip Morris Inc.*, 229 F.3d 1120, 1124-25; 56 USPQ2d 1456, 1459 (Fed. Cir. 2000) ("a showing of a suggestion, teaching or motivation to combine the prior art references is an 'essential component of an obviousness holding' ") (quoting *C.R. Bard, Inc. v. M3 Systems, Inc.*, 157 F.3d 1340, 1352; 48 USPQ2d 1225, 1232 (Fed. Cir. 1998)); *In re Dembiczak*, 175 F.3d 994, 999; 50 USPQ2d 1614, 1617 (Fed. Cir. 1999) ("Our case law makes clear that the best defense against the subtle but powerful attraction of a hindsight-based obviousness analysis is rigorous application of the requirement for a showing of the teaching or motivation to combine prior art references."); *In re Dance*, 160 F.3d 1339, 1343; 48 USPQ2d 1635, 1637 (Fed. Cir. 1998) (there must be some motivation, suggestion, or teaching of the desirability of making the specific combination that was made by the applicant); *In re Fine*, 837 F.2d 1071, 1075; 5 USPQ2d 1596, 1600 (Fed. Cir. 1988) (" 'teachings of references can be combined only if there is some suggestion or incentive to do so.' ") (emphasis in original) (quoting *ACS Hosp. Sys., Inc. v. Montefiore Hosp* 732 F.2d 1572, 1577; 221 USPQ 929, 933 (Fed Cir. 1984))."

To summarize, Applicant respectfully submits that there is no suggestion, motivation, or any reason for one of ordinary skill in the art to combine the elements of the

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Kolb et al and Bach references in the manner proposed by the Examiner. The only basis for making such a combination is found in the disclosure of the present application.

However, As held by the Patent Office Board of Appeals in Ex parte Lennox, 144 USPQ 224 (1964):

"References are not combined since there is no suggestion therein that they should or could be combined, absent applicant's disclosure in instant application; on the contrary, claimed combination would bring together portions of diverse patents dealing with different articles to obtain product not contemplated by apparatus disclosed."

The independent method Claim 9 of the application is likewise neither taught nor suggested by the references cited. That claim is directed toward a method of irradiating articles of packaging to neutralize harmful bacteria. As disclosed in the Specification this method of treatment is particularly useful in sanitizing food packaging products (Specification, page 1, lines 11-2). None of the references relied upon for rejection remotely suggests such a process, much less the practice of that process utilizing a NEMA 4 watertight housing. None of the references cited contemplates the focusing of ultraviolet radiation from an electrodeless lamp onto a quartz window in such a housing while conveying food packaging through the irradiation treatment area exterior of the housing beneath the quartz window.

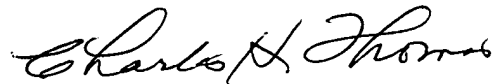
For all of the foregoing reasons, Applicant respectfully requests reconsideration of

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the rejection of claims, and allowance of all claims of the application.

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Respectfully submitted,

A handwritten signature in cursive script, appearing to read "Charles H. Thomas".

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